



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>7</sup> :</b> <b>E04B 1/344, E04H 12/18, 5/12, A61F 2/06, A61B 17/16, 17/02, A61F 13/20, 2/04</b>	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 00/12832</b> <b>(43) International Publication Date:</b> 9 March 2000 (09.03.00)
<b>(21) International Application Number:</b> PCT/US99/19457 <b>(22) International Filing Date:</b> 26 August 1999 (26.08.99)  <b>(30) Priority Data:</b> 09/140,510                      26 August 1998 (26.08.98)                      US  <b>(71) Applicant (for all designated States except US):</b> MOLECULAR GEODESICS, INC. [US/US]; 20 Hampden Street, Boston, MA 02119 (US).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> CLIFFORD, Dale, Timothy [US/US]; 311 Lamartine Street, Boston, MA 02210 (US). INGBER, Donald, E. [US/US]; 71 Montgomery Street, Boston, MA 02116 (US).  <b>(74) Agent:</b> ANASTASI, John, N.; Wolf, Greenfield & Sacks, P.C., 600 Atlantic Avenue, Boston, MA 02210 (US).		<b>(81) Designated States:</b> JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>  <b>(88) Date of publication of the international search report:</b> 15 June 2000 (15.06.00)
<b>(54) Title:</b> RADially EXPANDABLE DEVICE  <b>(57) Abstract</b> <p>An expandable device is provided that includes a plurality of elongated members that are positioned and arranged to define a lattice structure having crossing points (or nodes) along interior positions of the elongated members. Preferably, the lattice structure is a hyperboloid of revolution. The device includes a plurality of flexible interconnectors located at the crossing points for securing one elongated member to another. The device is radially compressible and expandable. The device may include flexible joiner elements at that join at least two elongated members together at their ends to form an apex. The device may be used in a variety of applications including medical applications such as surgical retractors, space creators, endoluminal prosthesis, such as catheters, dilators or stents, mechanisms for expanding stents, controllably catheters, drains or valves and connectors for hollow organs. The device may also be used in building and construction applications such as emergency shelters, housing structural supports, receptacles, masts and cooling tower support structures.</p> <div> </div>		

***FOR THE PURPOSES OF INFORMATION ONLY***

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 99/19457

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E04B1/344 E04H12/18 E04H5/12 A61F2/06 A61B17/16  
A61B17/02 A61F13/20 A61F2/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E04B E04H A61F A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>EP 0 744 575 A (ALEPH CO LTD) 27 November 1996 (1996-11-27)</p> <p>page 2, line 5 - line 8 page 2, line 48 - line 54 page 10, line 10 -page 12, line 14 page 13, line 24 -page 14, line 35 page 15, line 29 -page 16, line 9 page 17, line 3 - line 32 page 19, line 19 - line 38; figures 1-11,21-28,35-37,41,42,60-63 ---</p> <p style="text-align: center;">-/-</p>	<p>1-3,5-7, 17,20, 21,26, 27,29, 30,38, 51,53, 55,63, 64,67, 68,71, 72,74,75</p>

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*Z\* document member of the same patent family

Date of the actual completion of the international search

20 December 1999

Date of mailing of the international search report

17.04.2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

PORWOLL, H

# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 99/19457

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 91 719 E (SOISSON) 2 August 1968 (1968-08-02)  page 1, left-hand column, line 1 -page 2, left-hand column, line 15 page 2, right-hand column, line 38 -page 3, left-hand column, line 47; figures 1-4 ---	1-7,9, 20,21, 26,27, 32,37, 38,63, 64,68, 71,72,75
X	US 4 290 244 A (ZEIGLER THEODORE R) 22 September 1981 (1981-09-22)  column 2, line 31 -column 4, line 60; figures 1-6 ---	1-7, 27-30, 37,38, 63,64, 68,71, 72,75
X	US 4 825 225 A (WATERS TERRANCE J ET AL) 25 April 1989 (1989-04-25)  column 4, line 19 -column 5, line 66; figures ---	1-3,5-7, 17,20, 21, 24-26, 28-30, 32,37, 63,65
X	US 4 115 975 A (BLISS ROBERT L) 26 September 1978 (1978-09-26)  column 3, line 7 -column 4, line 52 column 7, line 23 -column 9, line 3; figures 1-10 ---	1-3,5-7, 12,27, 29,30, 37,53, 63,64, 67,71, 72,75
X	US 4 253 284 A (BLISS ROBERT L) 3 March 1981 (1981-03-03)  column 6, line 48 - line 64; figures --- -/--	1-3,5-7, 28-30, 63,64, 68, 71-73,75

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/19457

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 4 276 726 A (DERUS DAVID L) 7 July 1981 (1981-07-07)</p> <p>column 1, line 6 - line 14 column 3, line 13 -column 4, line 47; figures 1,4</p> <p style="text-align: center;">---</p>	<p>1,3,5-7, 29,31, 54,63, 64,71, 72,74,75</p>
A	<p>FR 976 692 A (CHEVREAU &amp; AL) 21 March 1951 (1951-03-21)</p> <p>page 1, left-hand column, line 1 -page 2, left-hand column, line 6 page 2, left-hand column, line 22 - line 25; figure 1</p> <p style="text-align: center;">---</p>	<p>1,2,17, 20,25, 27,53</p>
A	<p>FR 2 149 711 A (BAU MONTAGEKOMBINAT KOHL) 30 March 1973 (1973-03-30) page 1, line 1 - line 5 page 3, line 33 -page 4, line 26; figure</p> <p style="text-align: center;">-----</p>	<p>1,2,52</p>

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 99/ 19457

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-18, 20-38, 51-55, 63-76.

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

1. Claims: 1-18,20-38,51-55,63-76 (searched)

Use of a radially expandable and contractable device in the field of building construction and civil engineering.

2. Claims: 1,19,39-50,56-62 (not searched)

Use of a radially expandable and contractable device in the medical field.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte. nal Application No

PCT/US 99/19457

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0744575 A	27-11-1996	WO 9521350 A	10-08-1995
		AU 688790 B	19-03-1998
		AU 7624294 A	21-08-1995
		US 5761871 A	09-06-1998
		AU 5979994 A	21-08-1995
		CA 2182789 A	10-08-1995
		WO 9521351 A	10-08-1995
FR 91719 E		NONE	
US 4290244 A	22-09-1981	US 4026313 A	31-05-1977
		US 4437275 A	20-03-1984
US 4825225 A	25-04-1989	NONE	
US 4115975 A	26-09-1978	NONE	
US 4253284 A	03-03-1981	NONE	
US 4276726 A	07-07-1981	US RE31641 E	07-08-1984
FR 976692 A	21-03-1951	NONE	
FR 2149711 A	30-03-1973	DE 2154530 A	15-02-1973